Outdoor Class B RMU enclosure

Siemens Flat Pad, Class B enclosure for Siemens 8DJH 11/22 kV RMUs

1. Introduction

The Siemens Flat Pad enclosure is a Type Tested outdoor enclosure for use with Siemens 8DJH series Ring Main Units.

'Flat-pad' refers to the enclosure being mounted on a flat concrete foundation pad. The arc compliance is obtained by 'built-in' baffles in the enclosure. This solution does not require any specific below-ground void/chambers to maintain arc compliance, making it ideal for sites where ground water can alter the volume of 'venting space' and hence void compliance.

The enclosure (with internal Ring Main Unit fitted) is pre-mounted on the flat-pad to simplify installation. This allows the 'Ring Main Unit' to be quickly and cost-effectively installed by lifting the entire configuration onto a prearranged below-grade foundation such as a cable vault or pillar/posts.

Figure 1. Flat Pad enclosure ready for installation.

Two sizes of enclosure/concrete foundation pad are available to suit different Ring Main Unit switch configurations of up to 4 or 5 functions blocks.

Size	Enclosure (w x d x h)
4 function	1950 x 940 x 1645 mm
5 function	2380 x 940 x 1645 mm

Figure 2. Four-function enclosure with RRT switchgear.

The enclosure switch combinations are internal arc classified:

- IAC A (authorised personnel) Front, Lateral and Rear
- IAC B (unrestricted accessibility including public) Front, Lateral and Rear

Type tested to IEC 62271-202 ensures maximum safety for network operating staff as well as the general public.

IAC B specification is **critical** for all network switching assets accessible to the public – especially where switching is untaken remotely or autonomously.

2. Design & installation philosophy

An arc fault can generate explosive forces. To mitigate this, the enclosure provides a series of chambers and ducts to vent via a protected external grill. Pressure build-up is routed via internal baffles to reduce the force and intensity of a discharge to the external environment.

These venting mechanisms are integral to the enclosure and do not require any free below-ground space. Thus the arc performance is not compromised by water filled ducts or incorrect chamber sizing.

3. Features

Siemens Flat Pad Class B solution offers:

- A compact outdoor enclosure
- Class B certified, independent of foundation
- Two wide opening doors with hold-backs, allowing easy operator access to switch gear
- Multiple-point door locking mechanism with padlock hasp for security
- Two earth points, internal or external, to be specified
- Window to allow fault passage indicator or other status to be seen from a distance
- Removable front checker plate on foundation pad to aid cable entry
- Support for many combinations of Siemens 8DJH switch gear functions
- Automation provided within a Transformer fused panel or in a separate panel
- The same foundation pad used for Siemens Class A outdoor enclosure

4. Technical Specifications

External Material	Galvanised Steel
Paint finish	Powder coated
Colour	RAL6020
IP rating	IP 54
Electrical	Up to 24 kV, 20 kA-1s, 630 A, 50 Hz

5. Siemens 8DJH RMU

Siemens 8DJH Ring Main Unit is suitable for 11/22 kV applications. RMUs are 630 A rated, and optionally extensible left and right. The switching mechanism is sealed for life, providing a maintenance-free service life. Ring Switches/disconnectors and Circuit breakers can be motorised and automated.

Panel types include[1]:

- Ring switch [=R]
- Transformer fused feeder [=T]
- Circuit breaker [=L]
- Bus section [=S or H]
- Metering unit [=M]

[1] Not all combinations can be accommodated.

Please refer to Siemens 8DJH documentation for specification on panels.

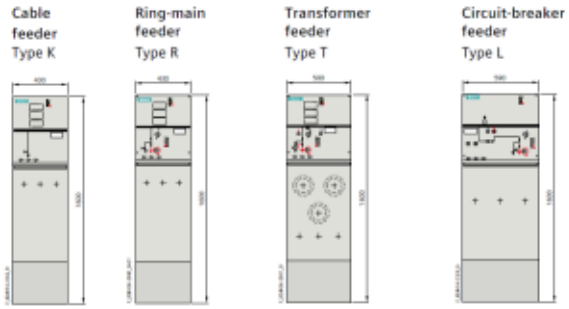

Figure 3. Typical panel types.

6. Fault Passage Indicators

Horstmann Sigma F+E3 is normally provided on ring switches in non-automated solutions and the ComPass B in Automated solutions. However, Siemens FCM and other solutions are also available.

Figure 4. ComPass B fault passage indicator.

Figure 5. External indication via front door window.

7. Automation & Protection

HV Power's standard automation package can be fitted within space available in a Transformer Fused Feeder panel. This provides a very compact and cost-effective means of automating the switch gear. Functionality can be customised to the needs of each network, but typically includes SCADA visibility of switch position, reporting of ComPass B fault passage and measured values, various switch gear and automation status and remote control. Serial and Ethernet SCADA protocols are supported including DNP, MODBUS and IEC 68150.

The automation can be supplied as standard, or where arranged the RMU can be supplied 'Automation Ready'. This is where key components can be field fitted to enable automation to be added later – deferring capital expenditure till needed.

Automation possibilities include:

- Motor operation of ring switch disconnectors
- Shunt trip and spring recharge for circuit breakers
- Shunt trip of fused feeders

If a Transformer Fused Feeder is not included in the panel arrangement, or an alternative customer specified controller is required, then to accommodate automation equipment, an automation cubicle needs to be provided in one of the 4/5 function block spaces. This withdrawal type cubicle can be equipped to specific customer requirements. Space is available for:

- Protection relay
- Batteries
- Battery charger
- RTU & Radio
- Heater

Where Circuit Breaker panels are provided, these can be fitted with IKI-35 Self-powered protection relays, and motorised for remote operation – with the standard automation controller. The IKI-35 mounts directly in the circuit breaker panel. If more advanced protection relays are required, these must be fitted in an automation cubicle, taking one of the available 4/5 function block spaces.

Figure 6. IKI-35 Self-powered relay and mounting location.

Figure 7. Automation controller, battery and charger – ready to fit in Transformer T panel.

The brains of HV Power's automation solution is provided by Siemens A-8000 series 'CP-8021' processor. While supplied 'ready to go' with supplied SCADA map, customer adaption can be made via a web tool/interface, or a site swap-out of SD memory card. A simple web tool or the more complex 'Toolbox II' tool may be purchased.

The A-8000 features -40 to +70 deg C temperature range and 5 kV EMC/surge voltage withstand – making this a very reliable 'outdoor' controller.

HV Power's automation controller can also be programmed where network automation or interlocking is required. Contact HV Power to discuss advanced options such as voltage sensing, sync check, automatic-change-over or restoration functions.

Figure 8. Siemens CP-80xx processor, when coupled with other interface modules, has a wide range of applications within a typical power utility environment.

Figure 9. Simple web-based setup tool.

8. Panel dimensions

General enclosure dimensions (mm):

Type	Enclosure External Width	Enclosure Height above foundation	Enclosure Depth	Weight[1]:	Foundation pad
Small (4-way)	1950	1455	940	320 kg	2250 x 1165 x 175 (650 kg)
Large (5-way)	2380			400 kg	2680 x 1165 x 175 (820 kg)

[1] Not including switchgear

9. Panel configurations

The 4-function block enclosure has been designed for a RRTT combination and can fit any alternative panel order or alternative panel type combinations provided the panel width does not exceed that of RRTT (1480 mm).

The 5-function block enclosure has been designed for RRTTT combination and can fit any alternative panel order or alternative panel type combinations provided the panel width does not exceed that of RRTTT (1910 mm).

Standard automation controller can be provided within a 'T' panel. If there is no 'T' panel or an alternative controller or alternative protection relays are required, an automation cubicle ('A') is required, taking 430 mm space.

Siemens 8DJH switchgear dimensions:

Standard Modules [1]:	Type	Width (mm)
Ring switch	R	310
Transformer feeder	T	430
Circuit breaker	L	430
Billing metering panel	M	840
Bus section	S or H [2]	430
Automation cubicle	A	430

[1] Refer to 8DJH catalogue for full details on modules. A range of other modules are available

[2] Other bus section options available ranging from 500 to 620 mm width

Guide to permitted combinations:

Pattern[1]:	Small Enclosure (4-way)	Large Enclosure (5-way)
Any three panels (R/T/L/A)	Yes	Yes
Any four panels (R/T/L/A)	Not all combinations possible	Yes
Any five panels (R/T/L)	No	Not all combinations possible

[1] Not all combinations are type tested.

Example configurations:

4-way enclosure			5-way enclosure	
Pattern	Automated option		Pattern	Automated option
RRRR			RRRRR	
RRRRT			RRRRT	Yes
RRTT	Yes		RRRTT	Yes
RRRL			RRTTT	Yes
RRLL			RRRRL	
RRTL	Yes		RRRLL	
RLL			RRTTL	Yes
LLL			RRTLL	Yes
			RRLLA	Yes
			RLLA	Yes
			LLLA	Yes

10. Order codes

Order codes are generated in consultation to define a customer's standard design. This specifies:

- Enclosure size
- RMU configuration
- Automation requirements
- Any special requirements

11. Other HV Power solutions:

Bosecker Class B Outdoor Enclosure

Where greater flexibility of configuration (such as extensibility, larger panels or stainless steel enclosures) is required, we recommend the Bosecker enclosure range. See our separate Technical Data sheet.

Figure 10. Bosecker Class B stainless steel enclosure.

Figure 11. Bosecker Class B with automated switchgear.

Siemens Class A Outdoor Enclosure

For non-automated functions, or applications in areas with restricted public access, the Siemens Class A enclosure can be considered.

The Class A enclosure is top rear venting, and can use the same flat pad concrete foundation. Class A enclosures are available in 1070 mm width (three functions) up to 2020 mm width. Three heights are available to accommodate LV panels etc.

Figure 12. Class A enclosure.